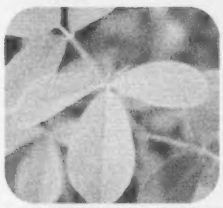

CROP TALK

Volume 14, Issue 2 OMAF and MRA Field Crop Specialists — Your Crop Info Source June, 2014

Table of Contents

1. Scouting Alfalfa Fields for Potato Leafhopper
2. The Appeal Of Late N Application In Corn
3. Things To Watch For In 2014 Corn
4. What is the Correct Time to Apply Foliar Fungicides to Soybeans?
5. Cover Crops Following Cereals and Late Summer Harvested Crops
6. Interpreting A Detailed Organic Amendment Analysis
7. Don't Lose Hay Yield To Poor P & K Fertility
8. Considerations For Horse Owners Buying Hay

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Scouting Alfalfa Fields for Potato Leafhopper

by Gilles Quesnel, Field Crop Integrated Pest Management Specialist, OMAF and MRA

Most years, potato leafhopper (PLH) is the "# 1 insect pest" of alfalfa. While PLH is seldom a problem on the first cutting of established alfalfa stands, the insect can start damaging new seedings as early as mid-June. The damage done by PLH is not as dramatic as the leaf shredding done by an alfalfa weevil outbreak, but the plant stunting caused by PLH significantly reduces alfalfa yield and quality (Figure 1).

Cropline 1-888-449-0937

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Ontario

The Insect

Leafhoppers usually arrive in Ontario in late-May. Adults are 3 mm (1/8 inch) long, lime green and wedge-shaped (Figure 2). The juvenile leafhoppers or nymphs are about 0.8 mm (1/32 inch) long when they hatch. They resemble adults, but are wingless and are often found on the underside of the leaves.

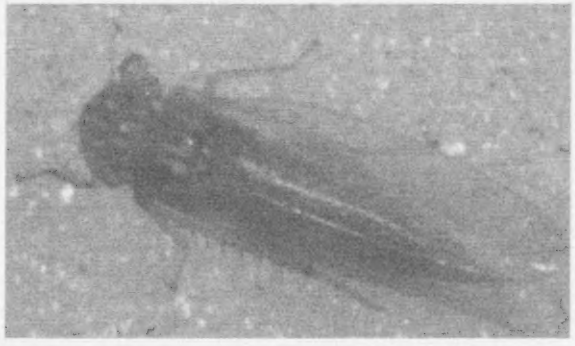


Figure 2 - Adult potato leafhopper

Damage

Both the adults and nymphs feed on alfalfa. Potato leafhopper feeds by inserting its mouth piece at the tip of the leaf and sucking plant juices from the alfalfa plant. While sucking the plant sap, PLH injects a toxin into the plant, which interferes with transportation of fluids and nutrients in the leaves. The result is the characteristic "hopperburn", which starts as a wedge-shaped "V" yellowish pattern at the leaf tips (Figure 3). The injury often goes undetected, with leaf yellowing and cupping, and plant stunting dismissed as "drought damage" or nutrient (boron) deficiency.

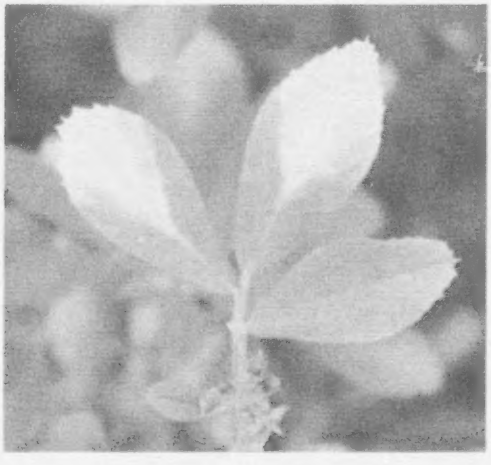


Figure 3 - Hopperburn symptoms

When left untreated, high PLH populations can reduce alfalfa yields by 1 tonne per acre or more, or the equivalent of a mid-summer alfalfa cut. PLH feeding also reduces root development and the crude protein level of the alfalfa harvested. Reduced yield and vigour in severely damaged stands carries over to future years, and can result in increased risk of winterkill.

Leafhopper damage is most severe in new seedings and during regrowth after cutting. Most of the PLH damage occurs from June to mid-August. High-risk factors include hot, dry seasons.

Scout Before Damage Occurs

It is important to identify the presence of leafhopper populations before the damage occurs since economic losses occur before visual plant symptoms appear. If leaf yellowing has already started, it is too late to prevent damage to that cutting and harvesting is the best option. Scouting with a sweep net will help you determine whether early harvest or spraying is needed. In new spring seedings, start scouting fields when the plants are 10 to 15 cm (4 - 6 inches) high. Scout at intervals of 5 to 7 days. In established stands begin scouting after first-cut, when plant regrowth is 5 to 10 cm (2 to 4 inches) high.

To determine the number of leafhoppers present, including adults and nymphs, take 10 sweeps and divide by 10. Do this in 5 representative areas of the field and note the height of the alfalfa. Recommended action thresholds are as follows:

Recommended Action Thresholds	
Stem Height	**Average Leafhoppers per Sweep**[1]
9 cm (3.5 in.)	0.2 adults
15 cm (6 in.)	0.5 adults
25 cm (10 in.)	1.0 adults or nymph
36 cm (14 in.)	2.0 adults or nymph

[1] 1 sweep = 180° (half circle) sweep with the net.

Management Strategies

- Alfalfa varieties resistant to PLH are available. These varieties have glandular hairs, both on the leaves and stems that act as mechanical barriers to PLH feeding. Varieties rated Highly Resistant (HR) to PLH include FSG400LH, TrailBlazer 4.0, WL345LH, and Pioneer 53H92 (www.goforages.ca). The glandular hairs are not fully expressed the first year, so treat new seedings of PLH-resistant varieties the same as regular alfalfa.
- When considering whether to use a PLH-resistant variety, include the level of PLH infestation expected in a typical year. PLH is typically more of a problem in the Lake Erie counties and Niagara area. Also consider the cost of scouting, insecticide and spraying, and the cost and performance traits of the PLH resistant variety, such as yield and disease resistance.
- Cutting alfalfa early will potentially reduce PLH egg, nymph and adult populations. A naturally occurring fungal pathogen helps reduce the populations of the PLH under cool, moist conditions.

Refer to OMAF/MRA Publication 812, "Field Crop Protection Guide" and product labels for insecticide information.

The Appeal Of Late N Applications In Corn

by Greg Stewart, Corn Specialist, OMAF and MRA

Recently there has been a fair bit of attention paid to late applications of nitrogen (N) in corn. Three things have contributed to this excitement:

1. Equipment that can deliver N (principally 28% - UAN) into much taller corn than traditional tractor-drawn sidedress equipment. This includes high clearance sprayers equipped with injection coulter toolbars or drop tube systems.
2. American high corn yield contest winners have been speaking in Ontario about how late (around tassel emergence time) N applications boost corn yields to new heights.
3. Research in the US Corn Belt has shown that new hybrids tend to take up more N post-silking than older hybrids. When this research was recently summarized, the amount of N taken up post-silking averaged 37% of the total crop uptake of N (Pioneer Crop Insight, March 2014).

Here are a few reminders to consider as we search for improved corn yield and improved nitrogen-use efficiency through later applications of nitrogen.

1. Ontario research supports the idea that split applications of N improve profit potential, especially if better N rate decisions based on rainfall, yield potential, soil nitrate status and crop colour can be made. The movement to high clearance equipment widens the window to make these "split" applications, and this may be a critical step forward in improving N management. However, if "improved" N rate decisions are not part of the system and we simply apply the same amount of N but do it in two applications rather than one, the profit improvement will not be as great.
2. While we consider 30 lbs of N per acre adequate to carry a corn crop to the typical sidedress window, it will likely be insufficient to carry a crop to waist high or beyond. 60—100 lbs/acre is probably a safer early season N rate.
3. Applying 240 lbs/acres of N early in the season and then coming back with another 60 lbs/acre at tassel time to win a yield contest is a much different context than applying 100 lbs/acre early and then coming back with 60 lbs/acre later to try to get improved yields. Dry soils, lack of soil incorporation, or no rainfall after the application of N, may result in the N supply being restricted to the corn plant and therefore a considerable risk of lower yields if only 100 lbs of N is actually available during peak demand periods.
4. The risks of not getting the N into the soil matrix are real and they increase as you delay N application later into the season. As we move to understand late applications of N and how to manage the options, it might be best to consider waist-high applications as a less risky option than waiting to chest high or tasselling corn.

We look forward to researchers, corn producers and industry personnel working together to refine nitrogen management systems that fit with modern high yielding hybrids and generate improved profitability and greater efficiencies in the way we use N fertilizers. 2014 will generate a significant amount of Ontario experience on later, high clearance applications of N in corn. Keep an eye out for these developments.

Things To Watch For In 2014 Corn

by Greg Stewart, Corn Specialist, OMAF and MRA

1. Strategic N Management Can Pay

If you apply all your nitrogen (N) pre-plant it is difficult to maximize return on your dollar invested in N. Split applications are often more profitable. However, the profit boost is not just from splitting. It really comes when the second application is adjusted for soil N supply. If you put 100 lbs down up front and side dress 40, that can improve returns somewhat. But if you put 100 lbs down up front and then use the weather and soil nitrate tests to decide whether this is the year you should sidedress 0,40 or 80 lbs, then the potential to improve returns jumps considerably.

2. Streamer Nozzle Application of UAN Has Risks After 4 Leaf Corn

Producers can apply UAN (28%) using streamer nozzles over the crop canopy up to the four-leaf stage with a little leaf burn but no yield loss. At later stages, the research suggest that crop injury or less available N lowers yields compared to UAN applied directly to the soil.

3. Watch N Losses From Surface Application.

When UAN or urea is applied to a wet soil surface the chances of losing N to volatilization goes up considerably compared to dry conditions. Crop residue will also add to the risk.

4. Emphasize Uniform Development

Don't ignore all the factors that can contribute to a uniform, high yielding stand. Fertilizer application, tillage uniformity, even distribution of crop residues, compaction, depth of secondary tillage, planting depth and seed trench conditions are all important to a uniform crop stand. You can have perfect spacing and not have a uniform, high yielding corn crop. Look for poor corn plants (2 or more leaf stages behind, smaller stem diameter, small ear, etc.). Investigate what might have caused this poor performance. Shallow planting, side wall compaction or poor root development should be first things to look for.

5. Experimenting with Spring Strip Tillage

Can we make strip tillage the winner in both profits and soil protection? We will focus on:

1. spring strip tillage,
2. incorporating all of our fertilizer in that zone while we go - so planting follows 6 hours later with no need for coulters, trash whippers, fertilizer, etc. and
3. using RTK GPS and run it on the contour so no blowing out row zones if we get a big rain.

Keep an eye out for equipment and plots in 2014.

What is the Correct Time to Apply Foliar Fungicides to Soybeans?

by Horst Bohner, Soybean Specialist, OMAF and MRA

Spraying soybeans with a foliar fungicide has not been common practice in Ontario. Over the last 10 years there has been increased interest in applying foliar fungicides to soybeans. Many trials have been conducted in Ontario to assess the yield and seed quality benefits. Averaged across 5 years of trials the average response has been 2.3 bu/ac. Seed size and quality can be improved, especially when there is significant disease pressure. In 2012 Dr. David Hooker (University of Guelph, Ridgetown) conducted trials to evaluate the correct timing for maximum economic return. The trial results were surprising in that soybeans responded more when sprayed relatively early. An application at the R2.5 growth stage (full flower) provided more yield than at later growth stages. Refer to Figure 1.

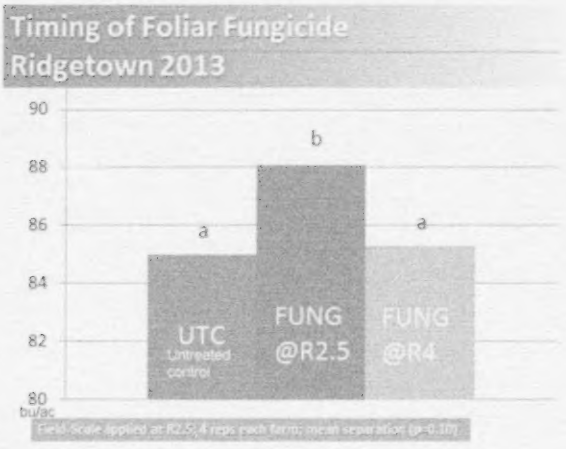


Figure 1

Although the economic return on fields with no disease is questionable, it does appear that earlier application timing may be necessary to maximize yield response. More trials are being conducted in 2014 to assess the best timing, including in-furrow applications. Stay tuned for the results.

Cover crops Following Cereals and Late Summer Harvested Crops

by Adam Hayes, Soil Management Specialist – Field Crops & Anne Verhallen, Soil Management Specialist – Horticulture Crops, OMAF and MRA

What is the best cover crop species to use following wheat and other crops harvested in late summer? Cover crops can help improve soil structure, protect the soil from erosion, cycle nutrients, provide feed for livestock and much more. Cover crops are not a magic solution for your soil problems, but when combined with other good soil management practices they can help improve soil health. Red clover is still the best cover crop option in winter wheat as it provides a nitrogen credit to the following crop and produces significant top and root growth. If red clover is not an option or did not establish, then planting cover crops following a cereal crop is the next option. Many think that volunteer cereal growth is good enough, but a planted cover crop can provide up to five times the above ground biomass and root growth. It can also suppress weed growth, which volunteer cereal growth cannot do.

Cover Crop Selection

The cover crop chosen for a field will depend on why you want to grow the cover crop. You will also need to consider how it will fit into your cropping and tillage system and how much time there will be for the cover crop to grow. The OMAF and MRA website http://www.omafra.gov.on.ca/english/crops/pub811/8building.htm#cover (in the soil management section) provides comprehensive information on cover crop species selection and management. The "Agronomy Guide for Field Crops", OMAF and MRA Publication 811 also has cover crop information. The Midwest Cover Crop website http://www.mccc.msu.edu/selectorINTRO.html provides an Ontario cover crop selection tool.

When to Plant

Following cereals, or any other crop, plant the cover crop as soon as possible to achieve the most growth. Another great opportunity to plant cover crops is following corn silage harvest, as there is little cover left to protect the soil. Annual cover crops can be planted up until six weeks before a killing frost is expected. After that point a winter cereal is the best option.

How To Plant

If volunteer cereal growth is present, consider whether or not to spray it to prevent it from competing with the cover crop. Ensuring that the straw was spread well at harvest will improve cover crop establishment. A drill, planter or air-seeder can be used. Cover crops can be no-tilled, or tilled and then planted. Placing the seed in the ground will provide the best opportunity for quick establishment. Seed can also be flown on, broadcast or broadcast and worked in, or applied with a liquid manure application.

Options

Table 1 includes some suggested options. Single species are simple. More complex mixes have been gaining favour. The following will achieve good ground cover at a reasonable cost.

Table 1 – Cover Crop Options

Cover Crop	Seeding Rate (frost sensitive)	Comments
Oats or barley	45 - 100 kg/ha - depends on goal and soil type (low rate on clay and higher on sand) (killed by frost)	- simple - can be used for forage - inexpensive - nitrogen scavenger - suitable broadcast or drill
Oats + radish	40 – 80 kg/ha oats 2 – 4.5 kg/ha radish (killed by frost)	- oat has fibrous root and radish a tap root - nitrogen scavenger - moderate cost - oats will help radish flow in the drill - broadcast or drill
Oats + clover	40 - 60 kg/ha oats 4 .5 kg/ha clover (oats killed by frost)	- grass and legume - clover produces nitrogen - moderate cost - broadcast or drill
Oats or barley + peas	80 - 100 kg/ha oats or barley 50 - 75 kg/ha peas Reduce seeding rate if not harvesting for feed.	- can be used for forage - grass and legume synergy - peas produce nitrogen - drill or broadcast - incorporate because peas are a large seed and need more moisture to germinate
Winter cereals (rye, wheat, triticale)	65 -130 kg/ha	- establishes and grows well in mid- to late-fall
Multi-mix grass + legume + brassica (i.e. oats or rye + clover or peas + radish)	Depends on species used.	- variety of growth habits - cost varies depending on species used and amount planted - 3 or more species can be included - can increase diversity - select mix carefully to ensure compatibility i.e. do not use buckwheat - some add sunflowers or other flowering cover crops to support pollinators - drill or broadcast and incorporate if peas or other large seeded crops are in the mix

Nitrogen and Cover Crop Growth

The spring cereals and the brassicas require nitrogen to grow just like corn and cereals we grow for grain. If manure has been applied then there will likely be enough nitrogen for good cover crop growth. If the cover crop is following a winter wheat crop then there may be very little growth without adding 35 - 55 kg/ha N of nitrogen. Legume cover crops should be inoculated if they haven't been grown in the field before.

Termination

Before planting a cover crop it is important to think about what management it may require. Many cover crops are killed by frost and don't require a herbicide treatment. Others will survive the winter and will need to be killed in the fall or spring. Some will go to seed, so they will need to be mowed or managed before then. Tillage, using a roller crimper or grazing are other methods that can be used to manage or terminate the cover crop.

Interpreting A Detailed Organic Amendment Analysis

by Christine Brown, Nutrient Management Specialist, Field Crops, OMAF and MRA

Analyzing organic amendments, such as manure, compost, digestate and biosolids, has always been recommended for macro-nutrients, but there is more to manure than just N-P-K. Significant micro-nutrients, organic matter and other elements are also present, and can reveal additional cost savings or management precautions.

An analysis does not give a lot of detail about the effect or the impact of the organic amendment on soil microbial activity. Soil microbial activity is important for its role in decomposition of crop residue and mineralization of nutrients. The larger and more diverse the microbial community, the greater the potential for soil microbial activity and enzyme process in increasing nutrient mineralization and nutrient cycling.

Table 1 provides an example of a solid analysis (compost material) and a liquid manure analysis (hog manure). The analysis report generally comes back in percentages and part per million (ppm). What do these numbers mean, and how can that information be used to enhance the value of the organic amendment? The "Available Nutrients" columns reveals the nutrients contained in the material based on Ontario guidelines. The comments column gives additional detail.

Table 1 - Comparing and Interpreting the Results of an Organic Amendment (Manure) Sample

	SOLID (Compost)		LIQUID (Hog manure)		Comments
	Analysis	**Available Nutrients (lbs/ton)**	**Analysis**	**Available Nutrients (lbs/1000 gal)**	
Dry Matter %	76.6	1,532	4.7	470	
Total Nitrogen (N) %	2.78	Organic N 14.9 + 4.5 NH_4-N = 19.4	0.38	Organic N 15.9 + 3.4 NH_4-N = 19.2	Total N – NH4-N = Organic N Organic N is slow release with microbial activity ranging from 5 - 30 % depending on: • Timing of application • C:N ratio • soil/weather conditions NH_4-N is readily available, but easily lost through volatilization. Same day incorporation provides ~ 75% of NH_4-N
NH_4-N (ppm) (ammonium-nitrogen)	3,003		2,114		
Phosphorus (P) %	0.62	22.8 (P_2O_5)	0.13	23.9 (P_2O_5)	• Assumption that P in manure is ~ 80% as available over time as commercial sources; where 20% is tightly tied to soil or lost in runoff or erosion Total P% x 1.84 x 100 = lbs/1000 gal available P_2O_5 Total P% x 1.84 x 20 = lbs/ton available P_2O_5. • Where soil fertility low, the full amount of P may not be available immediately after application and additional P_2O_5 may be needed (commercial sources).
Potassium (K) %	0.77	16.6 (K_2O)	0.10	10.8 (K_2O)	• Assumptions that K in manure is ~90% as available over time as commercial sources Total K% x 1.08 x 100 = lbs/1000 gal available K_2O. Total K% x 1.08 x 20 = lbs/ton available K_2O
Organic Matter %	51.6	791	3.5	16.5	• Available OM is reported as dry material returned to the soil • Existing soil organic matter levels will impact nutrient uptake/cycling/loss and water holding capacity. Where manure is applied regularly, soil organic matter levels are usually higher
Carbon	~ 500		~ 85		• Organic N x Carbon value from C:N ratio – gives a rough estimate. Organic carbon measurement can also be requested from a lab analysis

Continued on next page

	SOLID (Compost)		LIQUID (Hog manure)		COMMENTS
	Analysis	Available Nutrients (lbs/ton)	Analysis	Available Nutrients (lbs/ton)	
pH	5.8		7.5		• Ammonia volatilization occurs because NH_4-N in manure or solution is converted to dissolved NH_3 gas. More N is volatilized as pH and/or temperature increases • Some Digestate materials and Lystek have high pH and high ammonium-N and are subject to high N loss from volatilization when not immediately incorporated.
C:N ratio	10 : 1		5 : 1		• Carbon to Nitrogen ratio indicates how quickly carbon breakdown may occur. • Nitrogen is the food source for microorganism breaking down carbon. • C:N ratio ~ 10:1 is similar to soil conditions • C:N ratio over 25:1 (i.e. high bedding manure) could result in nitrogen from the soil being tied up to break down carbon and cause N deficiency
Bulk Density	455 kg/m^3	28.41 lbs/ft^3	1,062 kg/ m^3	66.3 lbs/ft^3	• Bulk Density is important considerations when planning for amendments that are being transported and applied. • Bulk density of broiler manure/compost materials are generally 25 lb/ft^3 where solid cattle manure with high bedding will often be greater than 50 lbs/ft^3 To convert: kg/m^3 x 2.2 ÷ 35.31 = lbs/ft^3
Sulphur (S) (ppm)	3966	7.9	314	3.1	• Significant portion as organic S – slow release with soil microbial activity • Regular application of manure will generally provide adequate S for crop requirements. • In-frequent application may not provide enough S for canola or alfalfa crops especially in cool - wet soil conditions
EC (conductivity) (ms/ cm)	15.68	20.1	12.95	83	All salts – K, NH4, Mg, Ca, Al and including sodium (Na) • EC and Sodium (Na) both measure salt content. • Both materials have a high salt content and would cause potential injury (seedling/ germination) if planting occurred too quickly after application or if material was surface applied (no-till) and conditions were very dry.
Sodium %	0.86	17.2	0.04	4.0	
Aluminum (ppm)	1726	3.5	38.9	0.4	
Boron (ppm)	20.4	0.04	2.4	0.02	
Calcium (%)	3.98	80	0.13	13	• Micro nutrients are reported as they exist in the organic amendment. • Availability for crop uptake varies with soil conditions, soil microbial activity, organic matter levels and existing fertility. • Generally in the year of application, about half of the sulfur, calcium and magnesium is available • About two-thirds of the boron, copper, iron, manganese and zinc is available for crop uptake.
Copper (ppm)	41.3	0.08	36	0.4	
Iron (ppm)	1970	3.9	113	1.13	
Magnesium (%)	0.43	8.6	0.07	7.0	
Manganese (ppm)	90.9	0.18	19	0.2	
Zinc (ppm)	385.5	0.77	61	0.61	

To convert to metric: lbs/1000 gallons ÷ 10 = ~ kg/m3, lbs/ton ÷ 2 =~ kg/tonne, ppm ÷ 10,000 = %

Don't Lose Hay Yield To Poor P & K Fertility

by Joel Bagg, Forage Specialist, OMAF and MRA

With higher land costs, increasing our yields is becoming key to reducing our costs of producing forage, and remaining competitive with corn and soybeans for acreage. Three factors limiting our forage yields are old stands, poor establishment and low soil fertility. Good soil fertility is essential to both yield and persistence. Phosphorus (P) and potassium (K) management is often overlooked, but is fundamental to producing forage to feed livestock and being competitive in today's market.

Soil Testing

Knowing how much P and K are available in the soil to start with is critical. Take a representative soil sample, send it to an accredited lab, and use the results to determine optimum fertilizer rates. Soil samples should be taken at least every 3 years. The time and effort it takes to do the soil sampling seems to be an obstacle, but with the cost of fertilizer there is likely no greater potential return on the cost and effort.

Relationship Between Soil Test & Forage Yield

When you get your soil test report, check the sodium bicarbonate phosphorus (P) and ammonium acetate potassium (K) soil test levels (ppm). (Use only these tests, as other tests (Bray or Mehlich) cannot be interpreted using Ontario calibration data.) How do your P and K soil test levels look?

Research shows that the yield loss of alfalfa is significant when P soil test levels are much below **12 ppm** (Figure 1) and K soil tests are below **120 ppm** (Figure 2). The yield curves at low soil test levels are steep. A positive yield response from applying fertilizer will be seen when soil tests are below these optimum levels. On the flip side, the yield curve at high soil fertility levels is flat. Don't expect any extra yield from applying fertilizer once the soil test results have been built up to higher levels. In these cases, you can choose to apply fertilizer to replace the nutrients removed by the crop to prevent future nutrient deficiencies, but don't expect extra yield from that maintenance application.

Figure 1

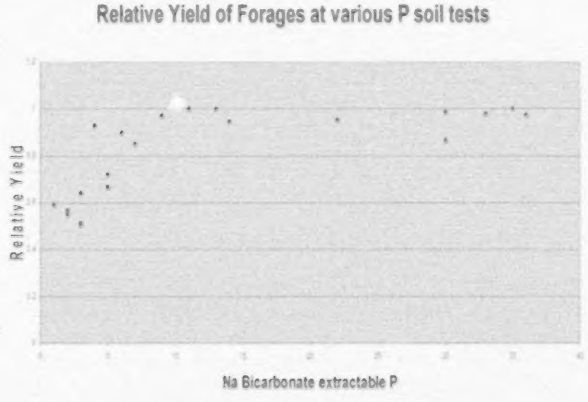
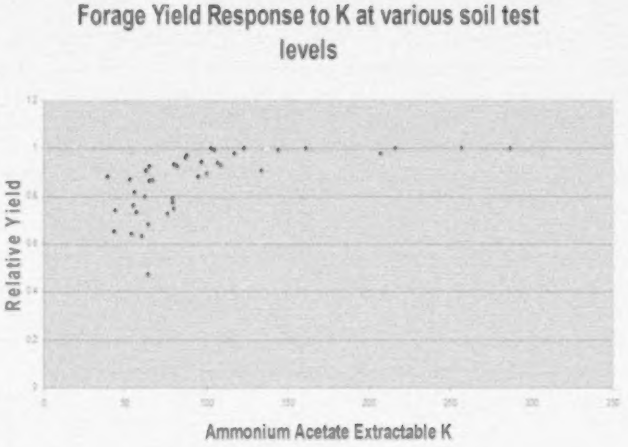


Figure 2



Crop Removal Of P and K

Forage crops remove a lot of nutrients and therefore have high requirements. With an alfalfa-grass mixture, a typical amount of P and K removed per tonne of hay harvested is equivalent to about **13.5 lbs (6.1 kg) of P_2O_5 and 54 lbs (24.6 kg) of K_2O**. As an example, assuming a mixed stand with a modest yield of 3.2 tonnes per acre per year, hay will remove about 43 lbs (20 kg) of P_2O_5 and 173 lbs (78 kg) of K_2O every year.

Unlike nitrogen, forage crops cannot generate P or K out of thin air. Without replacing P and K with manure or commercial fertilizer, the soil tests will drop quickly. Forage fertility needs to be managed within the life of the stand. Let's assume that it takes about **35 lbs/ac of P_2O_5 and 20 lbs/ac of K_2O to move the soil tests by 1 ppm** on some soils (these amounts will vary according to soil type and conditions). After only 4 years of harvesting forage without applying fertilizer, the P soil test could drop by 5 ppm and the K by 35 ppm. If the soil tests drop below the optimum levels during the life of the stand, this will significantly reduce yields. We also need to maintain soil fertility for the next crops in the rotation. At lower soil test levels, this "soil mining" is not acceptable. Yet it goes on in many hay fields every year.

There is a wide range of soil fertility levels found in hay fields across the province. Dairy farms that apply a lot of manure typically have higher P and K levels. However, K deficiency has become more common, even on some dairy farms! Hay fields that are infrequently (or never) rotated and seldom (or never) receive manure or commercial fertilizer, are typically very low in soil fertility and yield. In a soil fertility survey by the East-Central SCIA, 30% of the fields tested were below 10 ppm P_2O_5, while an astounding 81% of fields were below 100 ppm K_2O! In an alfalfa tissue test survey done in Ontario in 2012, 37% of the samples were below the critical level of 1.7% K, indicating a deficiency of soil K.

Sufficiency Approach
Tables 3-7 and 3-8 from OMAFRA Publication 811 "Agronomy Guide" http://www.omafra.gov.on.ca/english/crops/pub811/3fertility.htm provide the P and K recommendations on established forage stands. These recommendations use the "sufficiency approach" to supply the optimum needs of the current crop by giving the greatest short term (1 year) net returns to fertilizer.

Build Up & Maintenance Approach
A longer term method also used to determine fertilizer application rates is the "buildup and maintenance approach". This starts by determining the amount of nutrient removal of the crop (approximately 13.5 lbs of P_2O_5 and 54 lbs of K_2O per tonne of hay). It adjusts this by an amount required to increase (or decrease) the soil test levels (example - 35 lbs/ac of P_2O_5 and 20 lbs/ac of K_2O to move the soil tests by 1 ppm) to targeted optimum levels (12 ppm P and 120 ppm K), amortized over several years. Applying nutrients to soils that test much above these critical levels (12 ppm P and 120 ppm K) rarely results in a profitable response. Refer to OMAFRA Publication 611, Soil Fertility Handbook (http://www.omafra.gov.on.ca/english/crops/pub611/p611order.htm).

Other Recommendations
If manure is applied, reduce the fertilizer application according to the amount of P and K in the manure. For P and K recommendations at seeding (banded or not, with or without a nurse crop), or information on nitrogen rates, pH, manure application, sulfur and micronutrients (boron), refer to the Forage Fertility section of OMAFRA Publication 811, Agronomy Guide. www.omafra.gov.on.ca/english/crops/pub811/3fertility.htm .

Considerations For Horse Owners Buying Hay

by Joel Bagg, Forage Specialist, OMAF and MRA

Many horse owners are finding it increasingly challenging to find and purchase suitable "horse quality" hay at a price they can afford. Low hay yields due to dry weather in 2012 were followed by poorer quality as a result of rainy haying weather in 2013. However, there are also long term economic factors in play that are limiting hay production. Tighter supplies of quality horse hay may be the new reality of the future. Horse owners need to become astute hay buyers, develop good business relationships with hay producers and dealers, learn how to manage large bales on their farm, and minimize hay storage and feeding losses.

Weather and Agronomic Problems
Hay production was extremely challenging in 2012, with low yields and tight forage inventories. Yields were frequently reported at 50 – 75% of normal. Other agronomic factors that significantly reduced yields included winterkill and spring frost damage, as well as insect damage from alfalfa weevil, white grubs, armyworm and potato leafhopper. Yields were much better in 2013, but wet weather during first-cut resulted in considerable amounts being either rain-damaged or mouldy as a result of being baled at too high a moisture. Following alfalfa winter injury in some areas in the spring of 2014, inventories of quality horse hay may be tight again depending on the upcoming weather.

Longer Term Economic Trends
Economics determines the long term supply and price of hay. Hay will be available, but not necessarily at the prices we are used to paying. Historically, there have been surpluses of hay and a buyer's market existed. This kept hay prices down to a level that was often below the farmer's actual cost of production. However, economics have changed with the increased world demand and prices for crops such as corn, soybeans and wheat. Farmers have responded by growing less hay and more grain and oilseed crops. With declining beef cow numbers, the market for poorer quality cull hay has also declined. Corn and soybeans also have advantages over hay of more effective risk management from adverse weather, more hedging and marketing options, and assurance of payment by licenced elevators.

Significant reductions in forage acres in Ontario occurred between the 2006 to 2011 Census years, of 500,000 acres of hay and 250,000 acres of pasture. That's a lot of hay! Export demand for quality hay to the US is strong. Higher prices will be necessary for farmers to make the decision to grow more hay and increase acreage. The days of cheap hay sold at or below the true cost of production are likely over. Horse owners will need to deal with that new reality.

Hay Production Costs
Hay producers have bills to pay too. Hay prices are up, but the costs of producing hay, including fertilizer, land, machinery, buildings and labour, are also up. On a "cents per lb" of hay basis, the price of phosphorus and potassium fertility removed from the soil in hay is currently equivalent to about 1.5¢/lb.

Land costs can range from 1¢/lb on land that rents for $60/acre and yields a 3 ton crop, up to 4¢/lb on land that rents for $320/acre for a 4 ton crop. Establishment costs (seeding, weed control, etc) are typically about 0.5¢/lb. Harvest costs (cutting, raking, baling, handling, etc) can add up to 2 - 2.5¢/lb (using custom rates), while storage costs can add another 1¢/lb.

Adding up these costs can bring the cost of production to over 6 – 9¢/lb of hay, before any return to risk, management and profit. Quality hay must sell at a premium to compensate for rain-damaged mouldy hay sold at a discounted price. Returns for producing hay must be similar to competing crops or else farmers will simply grow those other crops instead.

Trend To Large Round and Large Square Bales
The production of small square bales is decreasing and large square bales are increasing. For hay producers, not only is more labour required to handle small squares, but this system also has less production capacity. A lot less hay can be made in a day with a small square baler. This means less hay can be made during those limited weather windows with no rain in the forecast. Horse owners switching to large bales will need a tractor and loader to move bales, and possibly a feed cart to be used in the barn. However, this can provide more hay options as small square bales get more difficult to source.

Large round bales are very common, but tend to be made to be fed on-farm or sold locally where they can be moved by tractor and wagon rather than a truck. They are usually less expensive and can work very well if fed outside in hay feeders, but caution needs to be used to avoid the risk of respiratory issues.

The use of large square balers is increasing because they increase production capacity, and also because large square bales are more dense and more easily transported than large round bales. Hay dealers are always looking for quality hay in large square bales. For horse owners, large square bales also have the advantage over large rounds in that they can be "flaked" and more easily pulled apart if being fed inside. This is especially true if the balers are fitted with "pre-cutter knives", where the hay is partially cut going into the baler chamber.

More Use of Hay Preservatives
In order to manage the risks of rain-damage, or mouldy hay from hay that must be baled before it is quite dry enough, many hay producers are using hay preservatives, such as commercially available buffered propionate products. Refer to "Preventing Mouldy Hay Using Propionate Preservatives" (http://fieldcropnews.com/?p=3655). Hay preservative use tends to be greater in "rainy" years, and with large square bales. There is no scientific evidence that CFIA registered hay preservatives are harmful to horses, but the health risks from feeding mouldy, dusty hay is well documented. Horse owners that choose not to feed hay treated with a hay preservative will find untreated hay increasingly difficult to source.

Hay Sources and Price Determination
Hay prices often move with perceived supply and demand. They peaked at unprecedented highs during the dry summer of 2012. Prices for quality 2013 crop hay remained strong, but at the same time prices for poorer quality hay returned to more traditional levels. Prices for this year's hay will be dependent on yields and quality. Small square bales usually bring a premium price, whereas large round bales are discounted because they are more difficult to handle, store and transport. Hay prices are widely variable depending on quality, species, bale type, and location. The Ontario Forage Council (OFC) has a free Hay Listings website for those wanting to buy or sell hay. (www.ontariohaylistings.ca/) As well, members of the OFC "Hay Marketing Forum", an association of hay dealers, are listed at www.ontarioforagecouncil.com/hay-marketing-forum/members.html.

Horse owners should seek to develop and maintain good business relationships with reliable hay producers and dealers that can provide a quality product. Making prompt payment is important. Bale size, density and weights vary significantly. If possible, price comparisons and hay purchases should be made on a "per lb" basis, rather than a price "per bale". Learn what hay quality criteria are "deal breakers", such as mould and dust, as opposed to factors that can be forgiven, such as sun bleaching on the outside of bales.

Minimizing Storage and Feeding Losses
It always amazes me that even with high hay prices I still see hay stored outside uncovered on the ground, and fed outside without hay feeders. Significant losses result. Inside hay storage is preferable, and pays for itself in the long term by reducing hay spoilage. Bottom bales exposed to a concrete or dirt floor will spoil from moisture. Storing bales on pallets or a layer of straw or other material will prevent this spoilage. As a minimum, bales stored outside should be placed on pallets and covered with a bale tarp, but even then some spoilage typically results. Unprotected bales will be damaged by rainfall, but also absorb moisture from the ground like a sponge, resulting in significant spoilage, mould and dust.

Using proper hay feeders outside will also save a lot of hay. A study at the University of Minnesota by Dr Krishona Martinson looked at the amount of feeding waste with several different horse hay feeder designs. Hay wasted by feeding hay on the ground without a feeder was 57%. Hay losses using a feeder ranged from 5 to 33% depending on the type of feeder. With high hay prices, well designed hay feeders pay for themselves very quickly. ("Selecting A Round-bale Feeder For Horse Use" www.extension.umn.edu/agriculture/horse/nutrition/selecting-a-round-bale-feeder/)

Summary
Hay prices are quite variable depending on the weather and growing season, but underlying economic trends are pointing towards longer term tighter hay supplies and higher prices than what we are used to. Horse owners should become astute hay buyers and develop strategies for securing quality hay and reducing storage and feeding losses.

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